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INFLUENCE OF METABOREFLEX STIMULATION ON CARDIAC POWER AND STROKE WORK DURING SUBMAXIMAL CONSTANT-LOAD EXERCISE IN HEART FAILURE

Oral Contributions
Room 10
Sunday, March 15, 2015, 11:30 a.m.-11:45 a.m.

Session Title: Young Investigator Awards Competition: Physiology, Pharmacology, and Pathology
Abstract Category: Physiology, Pharmacology, Pathology
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Background: Neural feedback from muscle afferents affects peripheral hemodynamics during exercise in heart failure (HF). The influence of this pathway on central hemodynamics is less clear. We examined the influence of metaboreflex stimulation on cardiac power and stroke work during submaximal constant-load exercise in HF.

Methods: 11 HF patients (age 51±5 yrs; EF, 32±3%; NYHA class, 1.6±0.2) and 11 controls (CTL; age 43±3 yrs) completed 3 cycling sessions (4 min - 60% of peak oxygen consumption, VO2). Session 1: baseline control trial. Sessions 2/3: bilateral upper-thigh cuffs inflated suprasystolic for 2 min at end-exercise (regional circulatory occlusion, RCO) with or without addition of inspired CO2 to maintain end-exercise end-tidal CO2 (RCO+CO2) (randomized). Rest, exercise, and recovery mean arterial pressure (MAP), heart rate (HR), VO2 were measured. O2 pulse (VO2/HR), cardiac power (VO2 x MAP) and stroke work (O2 pulse x MAP) were calculated.

Results: At end-exercise for all conditions, cardiac power and stroke work were attenuated in HF compared to CTL ($p<0.01$). During the control trial, at 2 min post-exercise compared to end-exercise, HF had attenuated recovery of cardiac power (55±4% vs 77±2%, $p<0.01$) and stroke work (41±5% vs 63±2%, $p<0.01$) compared to CTL. Similarly, during RCO, cardiac power (57±4% vs 84±2%, $p<0.01$) and stroke work (47±5% vs 75±3%, $p<0.01$) recovery was smaller in HF compared to CTL. During RCO+CO2, HF also showed attenuated recovery of cardiac power (57±3% vs 80±2%, $p<0.01$) and stroke work (46±4% vs 68±3%, $p<0.01$) compared to CTL. There were no differences between sessions within HF. The CTL group showed an attenuated recovery of cardiac power and stroke work during RCO ($p=0.04$ and $p<0.01$, respectively), and reduced stroke work during RCO+CO2 ($p=0.01$) compared to control trial.

Conclusion: These data suggest cardiac power and stroke work is attenuated during submaximal constant-load exercise persisting for up to 2 min post-exercise in HF compared to CTL. Importantly, neural feedback from metabolically sensitive afferents significantly influences cardiac power and stroke work in older healthy individuals but does not fully explain the differences between HF and CTL.